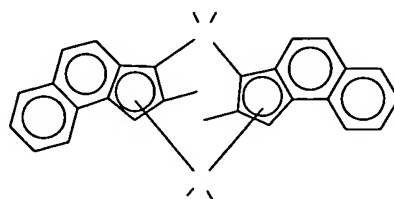


Claims:

1. A process for the diastereoselective synthesis of rac-diorganosilylbis(2-methylbenzo[e]indenyl)zirconium compounds of the formula I,

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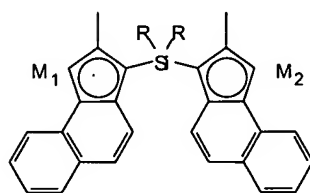
(I)

which comprises the following steps:

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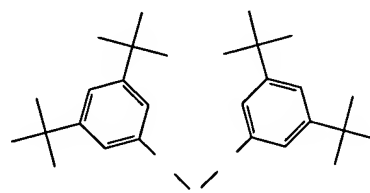
- a) reaction of a compound of the formula II with a zirconium bisphenoxide complex of the formula III to form the ansa-zirconocene bisphenoxide complex of the formula IV,

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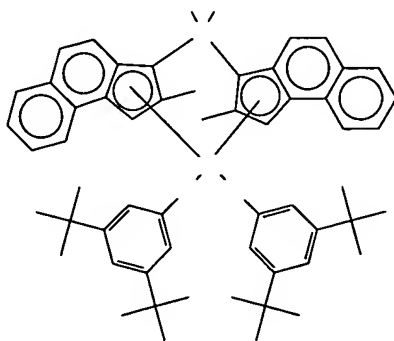
(II)



(III)

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(IV)

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b) replacement of the phenoxide groups of IV by X using suitable replacement reagents to give the compound of the formula I;

where

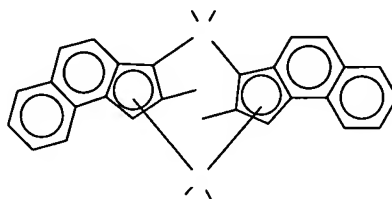
the substituents X can be identical or different and are each F, Cl, Br, I, or linear, cyclic or branched C₁₋₁₀-alkyl; and

the substituents R can be identical or different and are each linear, cyclic or branched C₁₋₁₀-alkyl or C₆₋₁₀-aryl; and

LB is a suitable Lewis base, and

M₁ and M₂ are monovalent positive alkali metal ions or M₁ and M₂ together represent a divalent positive alkaline earth metal ion.

2. A process as claimed in claim 1 for the diastereoselective synthesis of rac-diorganosilylbis(2-methylbenzo[e]indenyl)zirconium compounds of the formula I,

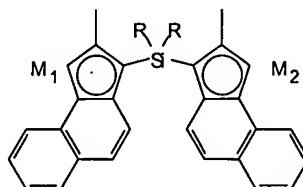


(I)

which comprises the following steps:

a) deprotonation of 2-methylbenzo[e]indene by means of a suitable deprotonating agent;

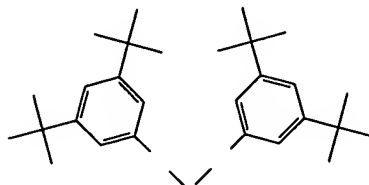
b) reaction of the deprotonated 2-methylbenzo[e]indene with a diorganosilyl compound R₂SiY₂, where the substituents R can be identical or different and are each linear, cyclic or branched C₁₋₁₀-alkyl or C₆₋₁₀-aryl and the leaving groups Y can be identical or different and are each F, Cl, Br or I, and subsequent repeat deprotonation by means of a suitable deprotonating agent, giving a compound of the formula II:



(II)

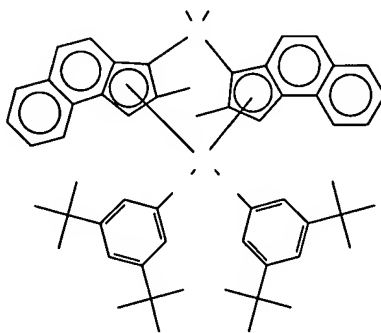
where M₁ and M₂ are monovalent positive alkali metal ions or M₁ and M₂ together represent a divalent positive alkaline earth metal ion;

c) reaction of the compound of the formula II with a zirconium bisphenoxide complex of the formula III:



(III)

where LB is a suitable Lewis base, to give a compound of the formula IV:



(IV)

d) reaction of the compound of the formula IV with suitable replacement reagents so as to replace the phenoxide groups of IV by X to give the compound of the formula I, where the substituents X can be identical or different and are each F, Cl, Br, I or linear, cyclic or branched C₁₋₁₀-alkyl.

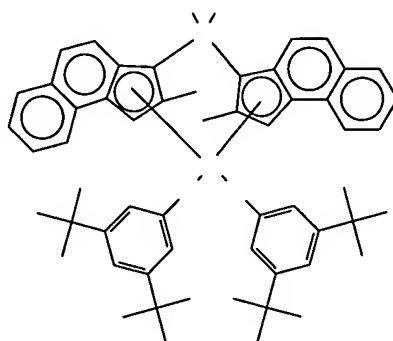
3. A process as claimed in claim 2, wherein the deprotonating agent is selected from among n-butyllithium, tert-butyllithium, sodium hydride, potassium tert-butoxide, Grignard reagents of magnesium, magnesium compounds such as, in particular, di-n-butylmagnesium, (n,s)-dibutylmagnesium and other suitable alkaline earth metal alkyl and alkali metal alkyl compounds.
4. process as claimed in claim 2 or 3 carried out without isolation of intermediates after individual process steps.

5. A process as claimed in any of the preceding claims, wherein the replacement reagent used is an aliphatic or aromatic carboxylic acid halide such as acetyl chloride, phenylacetyl chloride, 2-thiophenacetyl chloride, trichloroacetyl chloride, trimethylacetyl chloride, O-acetylmandelyl chloride, 1,3,5-benzenetricarboxylic chloride, 2,6-pyridinecarboxylic chloride, tert-butylacetyl chloride, chloroacetyl chloride, 4-chlorobenzacetyl chloride, dichloroacetyl chloride, 3-methoxyphenylacetyl chloride, acetyl bromide, bromoacetyl bromide, acetyl fluoride or benzoyl fluoride, either in solvents or as such.
6. A process as claimed in any of claims 1-4, wherein the replacement reagent used is SOCl_2 , silicon tetrachloride, methylaluminum dichloride, dimethylaluminum chloride, aluminum trichloride or ethylaluminum dichloride.
7. A process as claimed in any of claims 1-4, wherein the replacement reagent used is HF, HBr, HI, preferably HCl, either as such or as a solution in water or organic solvents such as diethyl ether, DME or THF.
8. A process as claimed in any of claims 1-4, wherein the replacement reagent used is an organoaluminum compound such as a tri- $\text{C}_1\text{-C}_{10}$ -alkylaluminum, i.e. trimethylaluminum, triethylaluminum, tri-n-butylaluminum, triisobutylaluminum or a dialkylaluminum chloride or an aluminum sesquichloride.
9. A process as claimed in any of the preceding claims, wherein the reaction is carried out in Lewis base-containing solvent mixtures of hydrocarbons and ethers or amines or both, preferably toluene and THF, toluene and DME or toluene and TMEDA.
10. A process as claimed in claim 9, wherein the Lewis base is present in an amount of 0.01–50 mol%, preferably 0.1–10 mol%, based on the solvent mixture.
11. A process as claimed in any of the preceding claims, wherein LB in the formula III is selected from among tetrahydrofuran (THF), dimethoxyethane (DME) and tetramethylethanediamine (TMEDA).
12. A process as claimed in any of the preceding claims, wherein M_1 and M_2 are selected from among lithium, sodium, potassium, rubidium or cesium ions or together represent magnesium.
13. A process as claimed in any of the preceding claims, wherein the substituents R are selected from among methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl and phenyl and combinations thereof.

14. A process as claimed in any of the preceding claims, wherein the substituents X are selected from among F, Cl, Br, I, methyl, ethyl, n-propyl, isopropyl, n-butyl and isobutyl, preferably Cl and/or methyl.
- 5 15. A process as claimed in any of the preceding claims, wherein R is methyl or ethyl, X is Cl and LB is THF or DME.
16. A racemic transition metal compound of the formula IV:

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(IV)

where the substituents R may be identical or different and are each linear, cyclic or branched C₁₋₁₀-alkyl or C₆₋₁₀-aryl.

- 25 17. A compound as claimed in claim 16, wherein the substituents R are selected from among methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl and phenyl and combinations thereof.
18. The use of a racemic compound as claimed in claim 16 or 17 as a catalyst or as a constituent of a catalyst for the polymerization of olefinically unsaturated compounds or as
- 30 a reagent or catalyst in stereoselective synthesis.